BENT DESIGN AND DETAILING CHECKLIST

Name of Project: Input data   Originator: Input name and initials   Date: _____
Name of Structure: Input data   Checker: Input name and initials   Date: _____
Structure Number: Input data
Project Number: Input data
PIN: Input data

BENT SHEETS – GENERAL INFORMATION	Provided (Originator)			Chk	Comments
	Yes	No	NA		
Bents typically take two to four sheets to detail. The designer is responsible for providing complete, accurate, and clear plans. The first sheet typically includes the following items. • Plan showing the bent cap and column locations • Elevation showing the footings, columns, and cap • Complex bridges or elevations representing several bents often include tables of elevations and a key plan defining locations of columns or bents • Notes, quantities and details as space allows The second sheet typically includes the following items. • Footing plan with reinforcing callouts • Footing sections with reinforcing callouts • Notes • Column elevation, sections, reinforcing callouts and details as space permits The third sheet typically includes the following items. • Column elevation, sections, reinforcing callouts and details • Notes and miscellaneous details The fourth sheet typically includes the following items. • Bent cap plan with reinforcing callouts • Bent cap elevations with reinforcing callouts • Bent cap details • Miscellaneous details On simple bridges, combine the first and fourth sheet and combine the second and third sheets.					
Bridges with complex geometry, phasing or precast elements may require additional sheets.					

TITLE BLOCK	Provided (Originator)			Chk	Comments
	Yes	No	NA		
Complete all information required in the standard title. • Top line = project name • Second line = structure name • Third line = sheet name					
Complete the title block.					
Fill in initials, dates, and signatures.					

BENT DESIGN AND DETAILING CHECKLIST

DESIGN	Provided (Originator)			Chk	Comments
	Yes	No	NA		
Meet the requirements of AASHTO LRFD and the UDOT Structures Design and Detailing Manual(SDDM). Meet the requirements shown on the Bent Design Sheet, DD-4.					
Meet the requirements of UDOT Std. Dwg. No. BA 1E for bents located inside the clear zone.					
Verify the material strengths used in design match the design data listed on the S&L.					
Apply all the superstructure loads to the bent.					
Include loads from sign structures attached to the bent. Design and detail the bent for the torsional moment, gravity loads and horizontal loads including seismic loading from the sign.					
Check the longitudinal thermal movement and loading due to movement.					
Check the lateral thermal movement and loading due to movement.					
Provide expansion material between shear keys and bent diaphragms to allow for lateral expansion at bents without integral diaphragms.					
Verify the pile loading and movement do not exceed the pile capacity.					
Verify the soil bearing pressure does not exceed the soil capacity.					
Meet the shear key design requirements specified in the SDDM.					
Check the minimum seat width requirements.					
Complete a FEM for bridges with a skew greater than 30°.					
Develop the reinforcing from the column into the footing or bent cap.					
Provide a continuous shadow line under the deck at integral diaphragms. Either provide a notch with a minimum depth of 5" and a minimum height of 5" between the bottom of deck and the top of diaphragm or stop the diaphragm a minimum of 8" from the edge of the deck.					Show notch on end diaphragm sheet.
Verify project specific aesthetic requirements are met.					
Check the reinforcing and anchor bolt locations for constructability. Specifically check the typical problem areas located at the top of columns (column reinforcing and bent cap reinforcing interference) and at anchor bolt locations.					
Allow 6" of construction tolerance in pile or drilled shaft details. Pay reductions apply to piles greater than 6" from the design location and piles are rejected if greater than 12" from the design location.					
Account for the formliner when listing clear cover.					

BENT DESIGN AND DETAILING CHECKLIST

PLAN	Provided (Originator)			Chk	Comments
	Yes	**No**	**NA**		
Show the North Arrow and verify the North Arrow direction.					
Label the horizontal control line of the bridge. Label the bearing of the control line.					
Provide the station at the intersection of the bent and the control line and indicate the direction of increasing stations.					
Label PC, PT, and PI stations when they are within the limits of the plan view.					
Label the PGL.					
Label the centerline of columns.					
Label the centerline of bearing pads and the centerline of bent.					
Label the centerline of girders and show the girder numbers.					
Label the horizontal control line to centerline of bearing angles. Use the same angle dimension convention shown for skew in the S&L.					
Identify and label the bearing seat areas.					
Show the location of foam under the girders. UDOT requires a foam layer in front of the bearing under the girder on integral diaphragm bridges.					
Label and define the anchor bolts and layout. Provide a detail view if required for clarity.					
Show all dimensions in feet and inches.					
Dimension the bent and connect the dimensioning to the control line. • Dimension the girder spacing along centerline of bearing • Dimension out to out of the bent cap • Dimension from the control line/centerline of bearing intersection to the centerline of a girder along the centerline of bearing provided • Dimension the column spacing or provide the column spacing on the elevation view • Locate and label the shear keys or provide the shear key spacing on the elevation view Add additional dimensions as needed to define the bent.					
Locate and identify the expansion, contraction, and required construction joints. Provide details of joints.					
Dimension and label the construction phase widths and construction phase numbers.					
Identify the reinforcing lines with appropriate reinforcing callouts when the main plan view is used to identify reinforcing.					
Provide the reinforcing lap length when required.					
Dimensioning in the additional plan views or detail views does not require a connection to the control line.					
Show the section cuts in the proper location and label the section.					
Typical title: **PLAN** • Use other descriptive titles as needed to distinguish between adjacent structures defined by a single structure number.					

BENT DESIGN AND DETAILING CHECKLIST

ELEVATION VIEW	Provided (Originator)			Chk	Comments
	Yes	No	NA		
Show and label the horizontal control line.					
Show and label the centerline of girder and girder number.					
Define the following elevations. • Bottom of footing elevations • Top and bottom of column elevations • Top of bent cap elevations • Bearing seat elevations • Top of shear key elevations					
Show the section cuts in the proper location and label the section.					
Provide the dimensions required to define the bent that are not shown in the plan view.					
Label the finished grade line and dimension the minimum and maximum fill over the footing.					
Label and dimension the construction phases.					
Identify the reinforcing, reinforcing spacing, and show the reinforcing lap length where required. Use mechanical splices where required.					
Provide tie reinforcing at 4'-0" maximum spacing in wall bents over 6'-0" tall.					
Provide an anchor rod detail showing the required anchor rod embedment and projection.					
Typical title: **ELEVATION** • Use other descriptive titles as needed to distinguish between adjacent structures defined by a single structure number.					

NOTES AND QUANTITIES	Provided (Originator)			Chk	Comments
	Yes	No	NA		
Place the quantities table in the lower right hand corner and place the notes above the quantities table. At a minimum list the structural concrete quantity. Add other quantities as necessary.					
Reference any related sheets.					
Include the bearing area note. • FINISH BEARING SEAT AREA HIGH. RUB OR GRIND LEVEL OVER BEARING SEAT AREA TO ELEVATION SHOWN ± 1/16".					
Specify the construction sequence when required.					

BENT DESIGN AND DETAILING CHECKLIST

SECTIONS	Provided (Originator)			Chk	Comments
	Yes	No	NA		
Label and identify the reinforcing.					
Show the centerline of the element detailed.					
Show the piles or drilled shafts in the footing section.					
Show the centerline of bearing in bent cap sections along with anchor bolts.					
Identify the formliner relief and extent.					
Label the required and optional construction joints.					
List the reinforcing cover if the cover is greater than 2".					
Show slope for drainage on the top of bent caps. Detail cap to eliminate potential for standing water on bent cap.					
Provide sections through the bent cap, bent column, bent footing and any additional locations required to adequately define the bent.					
Typical title: **SECTION X-X** • Use other descriptive titles as needed to distinguish between adjacent structures defined by a single structure number.					

BENT FOOTING PLAN	Provided (Originator)			Chk	Comments
	Yes	No	NA		
Show the North Arrow and verify the North Arrow direction.					
Label the centerline of columns and centerline of bent.					
Show all dimensions in feet and inches.					
Dimension the bent and connect the dimensioning to the control line. • Dimension out to out of the footing • Connect the footing dimensions to the column locations • Dimension the column spacing Add additional dimensions as needed to define the footing.					
Locate and identify the expansion, contraction, and required construction joints. Provide details of joints.					
Dimension and label the construction phase widths and construction phase numbers.					
Identify the reinforcing lines with appropriate reinforcing callouts.					
Provide the reinforcing lap length when required.					
Dimensioning in the additional plan views or detail views does not require a connection to the control line.					
Show the section cuts in the proper location and label the section.					
Typical title: **PLAN** • Use other descriptive titles as needed to distinguish between adjacent structures defined by a single structure number.					

COLUMN ELEVATION VIEW	Provided (Originator)			Chk	Comments
	Yes	No	NA		
Show the section cuts in the proper location and label the section.					
Identify the reinforcing, reinforcing spacing, and show the reinforcing lap length where required. Use mechanical splices where required.					
Identify and dimension the plastic hinge zones.					
Typical title: **COLUMN ELEVATION** • Use other descriptive titles as needed to distinguish between adjacent structures defined by a single structure number.					